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(54) Mineral wool insulating material

(57) A material for heat and sound insulation consists of at least two layers 2, 3 of mineral wool impregnated with a synthetic resin. The two layers differ at least in that they contain two different mineral wools. Two preferred mineral wools are rock wool and glass wool. An insulating member 1 can be made by impregnating the wools and curing an insulating shell for a pipeline being made by wrapping the two impregnated layers separately along a mandrel, airing the resin, removing the mandrel and optionally cutting the product into two half shells. Rock wool is preferably used on that part of the member that will be hottest and glass wool is preferably used on a covering.

Fig. 1

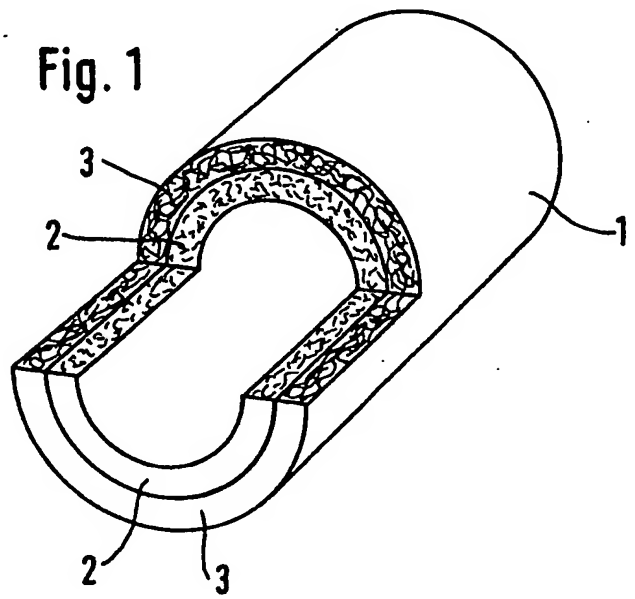

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Fig. 1

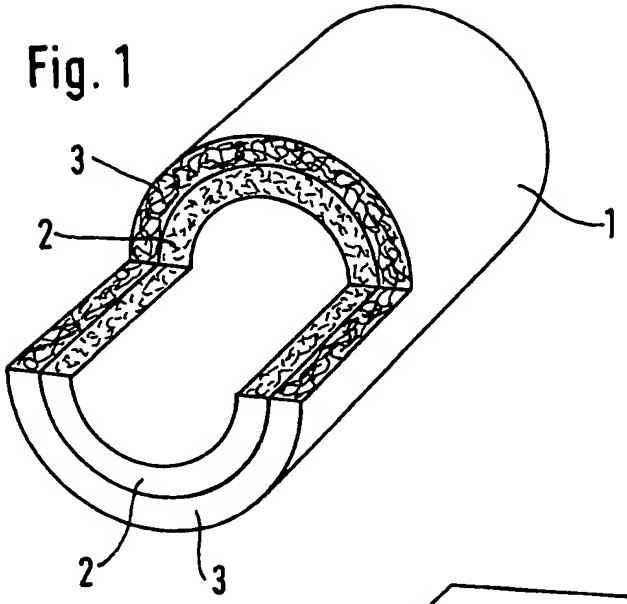


Fig. 2

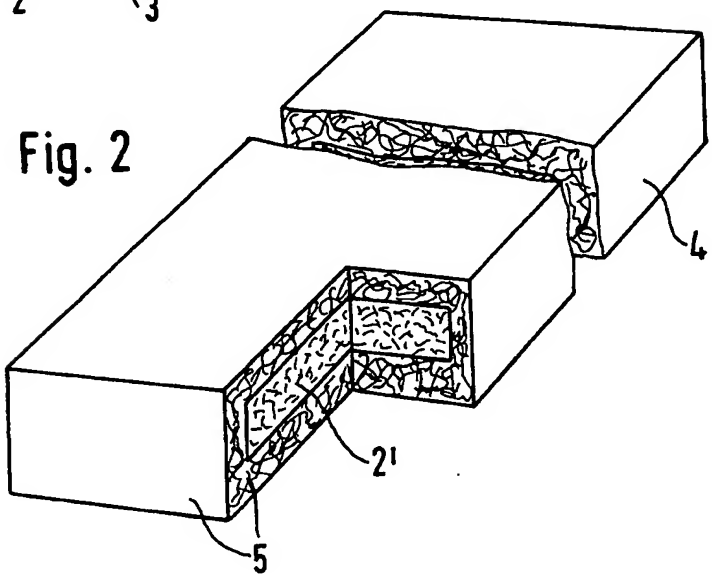
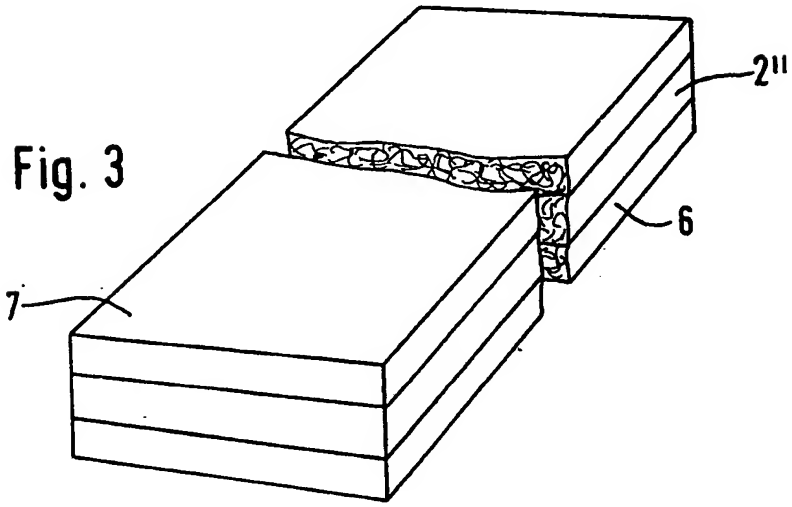


Fig. 3



SPECIFICATION

Mineral wool insulating material

This invention relates to an insulating material comprising mineral wool treated with a synthetic resin binder, and to a method of production.

Mineral wool such as glass wool and rock wool are the most conventional inorganic fibre materials which are used in insulating technology, but for specific applications it is also possible to use ceramic wool or abestos for insulating members according to the invention. Since ceramic wool generally has a higher temperature stability, namely up to 1400°C, such wools are conveniently used on the side of the insulating member which is exposed to the higher temperature.

Preformed insulating members of mineral wool can be used for the most diverse applications, particularly in building construction but also in other fields of technology. Such insulating members can be used not only for heat insulation, but also for sound insulation.

In the production of preformed insulating members mineral wool may be treated with a synthetic resin and the result converted to the desired shape while being compacted to a certain degree and heated to cure the synthetic resin binder and to fix permanently the shape of the insulating member.

Frequently employed shapes include panels, and tubular sleeves which can be divided after curing into two cylindrical half shells which can be recombined to form a cylindrical shell around a pipeline to insulate the pipe externally. In addition to such standard designs, corresponding insulating members of different shape may be produced for special purposes, for example insulation on interior casings of refrigerators and kitchen stoves.

Rock wool and glass wool are preferred mineral wools, and these two types of mineral wool have a series of different properties which render one or the other of them particularly suitable for specific purposes.

Rock wool has a greater temperature stability than glass wool and it can be employed at temperatures of up to 700°C while glass wool can sinter at temperatures as low as approximately 240°C. Furthermore, to achieve approximately the same fibre bond in the insulating material, glass fibre requires more binder substance than does rock wool. Approximately 1% of binder added to rock wool will produce the same bonding as 5 to 6% of synthetic resin binder added to glass wool. These two properties mean that a rock wool material has a higher flame-resistance rating than corresponding glass wool material.

On the other hand, owing to its longer fibre length and lower bulk density, glass wool can be used to make insulating material having a higher rigidity and a lower density. This leads to a substantial weight saving in insulating members. The substantially greater density of insulating rock wool material, owing to the short fibre length thereof and the resulting greater bulk mass per unit volume, leads to higher thermal losses of the insulated object in the presence of changing temperatures. This is true even if the temperature gradient across the insulating member is the same in both cases since the heavier rock wool mass material has to be heated more for any temperature increase.

As regards sound insulation, rock wool absorbs mainly lower audio frequencies, while glass wool acts mainly at higher audio frequencies. The two materials have a different effect on skin; rock wool should be processed and handled only with great care.

Depending on the degree of compaction in the production of the insulating members, a member of rock wool can have a density of the order of 100 kg/m^3 and a glass wool member can have a density of approximately 50-60 kg/m^3.

Depending on their application, one or other of such mineral wools has been used and processed, but only as competing or mutually exclusive substances. However, we have discovered that the combination of these materials leads to improved overall properties compared with those of known insulating materials.

Thus, the present invention consists in an insulating material comprising at least two layers comprising mineral wool impregnated with a synthetic resin binder; the mineral wools of the two layers having different properties. We prefer that the two types of mineral wool are rock and glass wool; where this is the case, an insulating member is preferably constructed such that an inner layer is of rock wool and a covering layer is of glass wool at least on one of its outsides.

An insulating material according to the invention can be produced when a base layer of rock wool, treated with a synthetic resin binder, and a covering layer or layers of glass wool treated with a synthetic resin binder, are placed one upon the other in any desired intended arrangement, are together converted into the desired shape, and are together subjected to heat treatment. A phenolic resin, which cures at approximately 245°C can be used as the synthetic resin binder. This method of production offers the advantage that different layers can be directly combined with each other during one heat treatment without any additional use of binder. The possible need for subsequent use of an adhesive for lining purposes is thus obivated.

Insulating shells for pipelines can be made. These comprise an inwardly oriented base layer of rock wool and a covering layer of glass wool which forms the outer external surface. Such double-layer insulating shells can be produced by coiling on a mandrel firstly layers of rock wool that have been treated with synthetic resin and then corresponding layers of glass wool; the configuration is then subjected to heat treatment, and subsequently the mandrel is removed from the finished insulating member, which is preferably then cut into two half-shells for ease of fitting to piping.

This construction of insulating shells is particularly suitable for the thermal insulation of hot pipelines. An internal base layer of rock wool having a higher thermal stability bears directly upon the surface of the hot pipeline. In accordance with the expected temperature gradient across the thickness of the complete insulating member glass wool is used instead of rock wool from a specific point of sufficiently low temperature onwards. The entire heat adsorption capacity of the insulating member and therefore its heat losses become lower. Furthermore, the outer layer of glass wool improves the rigidity and substantially facilitates handling of the insulating member since it is not necessary to touch the rock wool layer when the shell is installed.

It is particularly for these last reasons that insulating panels or other members are constructed having a base layer of rock wool surrounded with a covering layer of glass wool on all external surfaces. Such insulating members, which are more convenient for handling, can be used wherever the temperatures which are to be insulated are within specific limits. If such members are used for the insulation of refrigerators or the like, the internal base layer of rock wool will offer the advantage of absorbing even low frequency sounds of the noise generated by the drive units.

In general, the edges of larger panels will not need to be surrounded by a glass wool layer. Such panels can therefore be of sandwich construction comprising a middle layer of rock wool and two covering layers of glass wool.

Three particular insulating members will be briefly explained by way of example by reference to the accompanying drawings, in order to illustrate the invention.

Figure 1 shows a partially sectioned insulating shell for pipe insulation;

Figure 2 shows a block-shaped insulating member whose inner base layer of rock wool is completely surrounded by an outer layer of glass wool; and

Figure 3 is a plate shaped insulating member with a middle layer of rock wool and two covering layers of glass wool.

Figure 1 shows a cylindrical, tubular insulating member for the insulation of pipelines. The member is produced as a complete cylindrical tube in accordance with the manufacturing process described, and it is then cut along its median plane for the purpose of installation on pipelines. The pipe shell-like insulating member 1 comprises an inner base layer 2 of rock wool and an outer covering layer 3 of glass wool. The ratio of the thickness of the two layers depends substantially on the expected temperature gradient to which the insulating member will be exposed.

A cup corner of the block-shaped insulating member illustrated in Figure 2 shows that it comprises a base layer 2' of rock wool which is completely surrounded by a covering layer 5 of glass wool.

Figure 3 shows in fractionated form part of a plate-shaped insulating material which has not been processed to its final installation dimensions. It comprises a middle base layer 2' of rock wool in sandwich configuration, having each of the two principle surfaces covered with covering layers 6, 7 of glass wool.

CLAIMS

1. An insulating material which comprises at least two layers comprising mineral wool impregnated with a synthetic resin binder; the mineral wool of the layers having different properties.

2. An insulating material according to Claim 1, in which the wool of one layer is rock wool and the wool of the other layer is glass wool.

3. An insulating member comprising material according to Claim 1 or Claim 2.

4. A member according to Claim 3, in which an inner layer is of rock wool and an outer layer is of glass wool.

5. A member according to Claim 4, suitable for pipe insulation and constructed in the form of a cylindrical shell or two cylindrical half shells.

6. A member according to Claim 4 or Claim 5, in which the covering layer completely surrounds the said inner layer.

7. A member according to any one of Claims 3 to 6, in which a base layer of rock wool is provided on to surfaces, which are distal to each other, with a covering layer of glass wool.

8. An insulating plate according to Claim 3.

9. A method of making an insulating member according to any of Claims 3 to 8, in which a layer of rock wool is treated with a synthetic resin binder and a layer of glass wool is treated with a synthetic resin binder and these layers are placed together and are together subjected to heat treatment to set the resin.

10. A method according to Claim 9, in which the layers are formed into any desired shape after being placed together.

11. A method according to Claim 9 and suitable for the production of an insulating member according to Claim 5, in which a base layer of rock wool is coiled on a mandrel and a covering layer of glass wool is coiled on this base layer and the result is subjected to heat treatment to set the resin and subsequently the mandrel is removed.

12. A method according to Claim 11, in which each layer of wool is treated with resin before being wound on the mandrel.

13. An insulating material substantially as herein described with reference to the accompanying drawings.

14. A method of making an insulating member substantially as herein described.

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